ZC-24DO

CANopen/Modbus
I/O Module
24 Digital Output

User Manual

Contents:

CANopen FEATURES

TECHNICAL DATA	
BAUD RATE	20, 50, 125, 250, 500, 800, 1000 Kbits/s
TYPICAL ON/OFF DELAY	1 ms (with filter disabled)
CANOpen TECHNICAL DATA	
NMT	SLAVE
ERROR CONTROL	NODE GUARDING
NODE ID	HW SWITCH OR SOFTWARE
NUMBER OF PDO	1 RX
PDO MODES	Event Triggered, Sync (cyclic), Sync (acyclic)
PDO MAPPING	VARIABLE
PDO LINKING	SUPPORTED
NUMBER OF SDO	1 SERVER
ERROR MESSAGE	YES
SUPPORTED APPLICATION	CiA 301 v4.02
LAYER	CiA 401 v2.01

CANopen PDOs TRANSMISSION TYPE SUPPORTED

OBJECT VALUE 0x180x sub 2	TRANSMISSION TYPE
0	Synchronous - acyclic
From 1 to 240	Synchronous - cyclic
255	Asynchronous

CANopen PDOs MAPPING

OBJECTS FOR DEFAULT MAPPING				
PDO NR	COB-ID	MAPPED OBJECTS	INDEX	SUBINDEX
RPDO1	0x200 + NodeId	Digital Output [1..8]	0x6200	1
		Digital Output [9..16]	0x6200	2
		Digital Output [17..24]	0x6200	3

CANopen EMERGENCY MESSAGE

The Emergency message is composed by:
2 bytes of EEC (Emergency error code)
1 bytes of ER (Error Register)
4 bytes MEF (Manufacturer Error Filled Objects (0x1200)

EMERGENCY MESSAGE						
BYTE0	BYTE1	BYTE2	BYTE3	BYTE4	BYTE5	BYTE6
EER		ER	MEF			

EEC	
CODE	DESCRIPTION
0x0000	No Error
0x1000	Generic error
0x4201	CPU Temperature over T_HIGH_HIGH
0x4202	CPU Temperature over T_HIGH
0x4203	CPU Temperature under T_LOW
0x8110	Communication Can Overrun
0x8120	Error Passive
0x8130	Life Guard Error
0x8140	Recovered From Bus Off
0xFF20	CPU Error
0xFF30	
0xFF50	

ER							
BIT7	BIT6	BIT5	BIT4	BIT3	BIT2	BIT1	BIT0
Generic	0	0	Temperature	Communication	0	0	Manifacture

Where if the bit is 0 means no error

CANopen MANUFACTURER SPECIFIC PROFILE

If Hardware switches are in “from memory” mode the node address is selectable by **Object 0x2001**.

NODE ADDRESS (OBJECT 0X2001:)	
OBJECT VALUE	DESCRIPTION
0….127	Node Address

If Hardware switches are in “from memory” mode baud rate is selectable by **Object 0x2002**.

BAUDRATE (OBJECT 0X2002)	
OBJECT VALUE	DESCRIPTION
1	20 Kbit/s
2	50 Kbit/s
3	125 Kbit/s
4	250 Kbit/s
5	500 Kbit/s
6	800 Kbit/s
7	1 Mbit/s

Object 0x2030 can be used for monitoring the CPU temperature

CPU TEMPERATURE (OBJECT 0X2030)	
SUBINDEX	DESCRIPTION
1	Actual Temperature [℃/10]
2	Temperature for HOT STOP ERROR [℃/10] 95.0°
3	Temperature for HOT ERROR [℃/10] 90.0°
4	Temperature for COLD ERROR [℃/10] -25.0°

The HOT STOP Temperature sends in pre-operational the station.

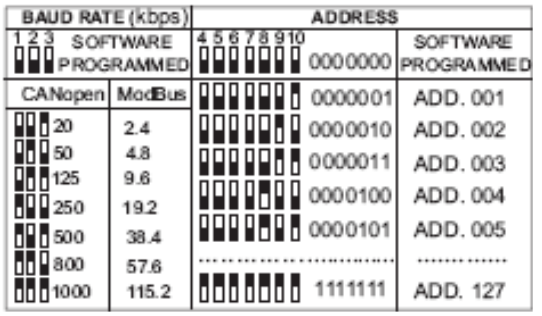
The HOT ERROR and the COLD ERROR Temperature sends the Emergency Object.

The Object is Read Only

Object 0X2520 can be used for monitoring outputs status:
“1” = ERROR
“0” = OK

OUTPUTS STATUS (OBJECT 0X2520)	
COMMAND CODE	DESCRIPTION
0x5C0n	OUTPUTS [1..8] STATUS
0x5D0n	OUTPUTS [9..16] STATUS
0x5E0n	OUTPUTS [17..24] STATUS

DIP-SWITCH CONFIGURATION



CANopen LED DESCRIPTION

SERVICE (DIAGNOSTIC) LED DESCRIPTION		
LED	**STATE**	**DESCRIPTION**
RUN	BLINKING	Pre-operational mode
	SINGLE FLASH	Stop mode
	ON	Operational mode
ERROR	SINGLE FLASH	At least one error counter has reached or exceeded the warning level
	DOUBLE FLASH	GUARD Event
	TRIPLE FLASH	The SYNC hasn't received within the configurated communication cycle timeout period
	ON	The CAN controller is bus OFF
	OFF	NO Error
FAIL	ON BLINKING	Data receiving from RS232
POWER	ON	Power Supply

OUTPUT LED DESCRIPTION		
LED	**STATE**	**DESCRIPTION**
1…8	ON	Output [1..8] is high
	OFF	Output [1..8] is low
9…16	ON	Output [9..16] is high
	OFF	Output [9..16] is low
17…24	ON	Output [17..24] is high
	OFF	Output [17..24] is low

CANopen DIGITAL OUTPUT MANAGEMENT

Object 0x6200 is used as 8 bit output

8 BIT OUTPUT (OBJECT 0X6200)	
SUBINDEX	DESCRIPTION
1	OUTPUT [1..8] VALUE
2	OUTPUT [9..16] VALUE
3	OUTPUT [17..24] VALUE

Object 0x6206 is used in FAULT case:
If the output n corresponding bit is “0”, this output keeps the last value;
If the output n corresponding bit is “1”, this output is loaded with object 0x6207

OUTPUT ERROR MODE (OBJECT 0X6206)	
SUBINDEX	DESCRIPTION
1	OUTPUT [1..8] ERROR MODE
2	OUTPUT [9..16] ERROR MODE
3	OUTPUT [17..24] ERROR MODE

Object 0x6207 is used to store outputs values to load, in fault case (only if in output error mode the corresponding bit value is “1”).

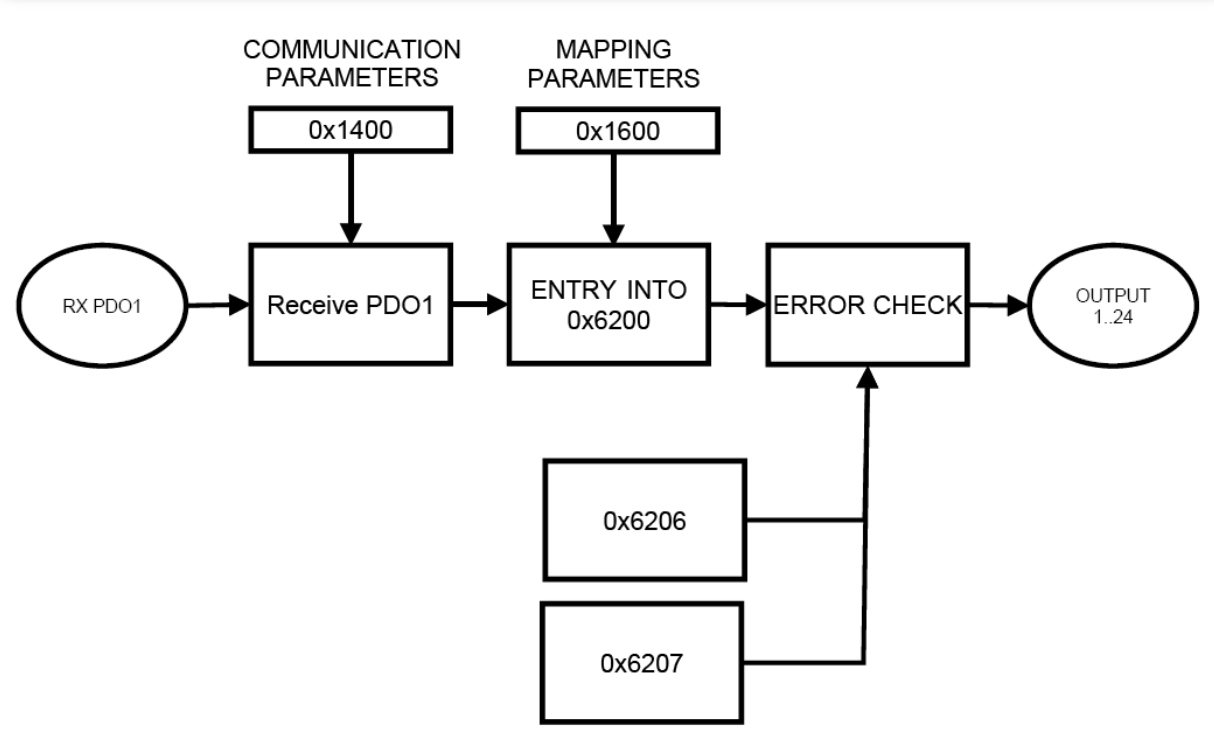
OUTPUT ERROR VALUE (OBJECT 0X6008)	
SUBINDEX	DESCRIPTION
1	Interrupt mask on falling edsge input [1..8]
2	Interrupt mask on falling edsge input [9..16]
3	Interrupt mask on falling edsge input [17..24]

Object 0x6220 is used for outputs corresponding bits

OUTPUT SINGLE BIT (OBJECT 0X6220)	
SUBINDEX	DESCRIPTION
1	Output 1 value
2	Output 2 value
3	Output 3 value
4	Output 4 value
5	Output 5 value
6	Output 6 value
7	Output 7 value
8	Output 8 value
9	Output 9 value
10	Output 10 value
11	Output 11 value
12	Output 12 value
13	Output 13 value
14	Output 14 value
15	Output 15 value
16	Output 16 value
17	Output 17 value
18	Output 18 value
19	Output 19 value
20	Output.20 value
21	Output 21 value
22	Output 22 value
23	Output 23 value
24	Output 24 value

CANopen FUNCTIONAL DIAGRAM

DIGITAL OUTPUT



CANopen OBJECT DICTIONARY

Communication Profile Area

INDEX	SUB INDEX	NAME	DESCRIPTION	TYPE	ACCESS	DEFAULT
0x1000	0	Device Type	Device Type (Profile 401 = 0x191)	UNSIGNED 32	RO	0x00030191
0x1001	0	Error register	Error register (DS 401)	UNSIGNED 8	RO	0
0x1002	0	Manufacturer Status Register	Status Register	UNSIGNED 32	RO	0
0x1005	0	SYNC COB-ID	The device consumes the SYNC message	UNSIGNED 32	RW	0x80
0x1006	0	Communication Window Length	Sync interval [us]	UNSIGNED 32	RW	0
0x1007	0	Synchronous Window Length	Time window [us] for the PDO transmission after the SYNC	UNSIGNED 32	RW	0
0x1008	0	Manufacturer Device Name	Device name	VISIBLE STRING	RO	“ZC-24DO”
0x1009	0	Manufacturer Hardware version	Hardware version	VISIBLE STRING	RO	“SC000000”
0x100A	0	Manufacturer Software version	Software version	VISIBLE STRING	RO	“SW001170”
0x100C	0	Guard Time	Guard Time [ms]	UNSIGNED 16	RW	0
0x100D	0	Life Time Factor	Max delay between two guarding telegrams = Guard_Time*Life_Time_Factor	UNSIGNED 8	RW	0
0x1010	0	Store Parameters	Max Subindex Number		RO	4
	1	Save All Parameters	Store not volatile parameters (Write in ASCII “save” for store process MSB 0x65766173 LSB)	UNSIGNED 32	RW	1
	2	Save Communication Parameters	Store not volatile parameters (Write in ASCII “save” for store process MSB 0x65766173 LSB)	UNSIGNED 32	RW	1
	3	Save Application Parameters	Store not volatile parameters	UNSIGNED 32	RW	1
	4	Save Manufactures Parameters	Store not volatile parameters	UNSIGNED 32	RW	1
0x1011	0	Restore Default	Max Subindex Number	UNSIGNED 8	RO	4
	1	Restore All Parameters	Restore not volatile parameters (Write in ASCII “load” for load process MSB 0x64616F6C LSB)	UNSIGNED 32	RW	0
	2	Restore Communication Parameters	Restore not volatile parameters (Write in ASCII “load” for load process MSB 0x64616F6C LSB)	UNSIGNED 32	RW	0
	3	Restore Application Parameters	Restore not volatile parameters (Write in ASCII “load” for load process MSB 0x64616F6C LSB)	UNSIGNED 32	RW	0
	4	Restore Manufactures parameters	Restore not volatile parameters (Write in ASCII “load” for load process MSB 0x64616F6C LSB)	UNSIGNED 32	RW	0

INDEX	SUB INDEX	NAME	DESCRIPTION	TYPE	ACCESS	DEFAULT
0x1014	0	COB-ID Emergency Object	COB-ID for Emergency Object	UNSIGNED 32	RO	NODEID + 0x80
0x1018	0	Identity Object	Max Subindex Number	UNSIGNED 8	RO	4
	1	Vendor ID	Seneca srl	UNSIGNED 32	RO	0x00000249
	2	Product Code	ZC-24DO Machine ID Code	UNSIGNED 32	RO	0x00000021
	3	Revision Number	Revision	UNSIGNED 32	RO	0
	4	Serial Number	Serial Number Code	UNSIGNED 32	RO	0
0x1200	0	Server SDO Parameters	Max Subindex Number	UNSIGNED 8	RO	2
	1	Receive SDO COB-ID	COB-ID of Receive SDO	UNSIGNED 32	RO	NODEID + 0x600
	2	Transmit SDO COB-ID	COB-ID of Transmit SDO	UNSIGNED 32	RO	NODEID+0x580
0x1400	0	Receive PDO1 Communication Parameters	Max Subindex Number	UNSIGNED 8	RO	3
	1	COB-ID	COB-ID of RxPDO1	UNSIGNED 32	RW	NODEID + 0x40000180
	2	Transmission Type	Transmission Type for TxPDO1 0x00 = Synchronous - acyclic 0x01 to 0xF0 = Synchronous-cyclic 0xFF = Asynchronous	UNSIGNED 8	RW	0xFF
	3	Inhibit Time	Not used in Rx PDO	UNSIGNED 16	RW	0x0000
0x1600	0	Receive PDO1 Mapping	Max Subindex Number	UNSIGNED 8	RO	4
	1	Object NR1	First Object (default Output 1..8)	UNSIGNED 32	RW	0x62000108 Object = 0x6000 Subindex = 1 Length = 8 bit
	2	Object NR2	Second Object (default Output 9..16)	UNSIGNED 32	RW	0x62000208 Object = 0x6000 Subindex = 2 Length = 8 bit
	3	Object NR3	Third Object (default Output 17..24)	UNSIGNED 32	RW	0x62000308 Object = 0x6000 Subindex = 3 Length = 8 bit

Manufacturer Profile Area

INDEX	SUB INDEX	NAME	DESCRIPTION	TYPE	ACCESS	DEFAULT
0x2001	0	Module Address	Station Address (only if dip switch 4,5,6,7,8,9,10 are OFF)	UNSIGNED 8	RW	127
0x2002	0	Buad Rate	Station Baud Rate (only if dip switch 1,2,3 are OFF) 1 = 20Kbps 2 = 50Kbps 3 = 125Kbps 4 = 250Kbps 5 = 500Kbps 6 = 800Kbps 7 = 1Mbps	UNSIGNED 8	RW	7
0X2030	0	Device Temperature	Max Subindex Number	UNSIGNED 8	RO	4
	1	Internal Temperature	Station internal Temperature [℃/10]	INTEGER 16	RO	0
	2	Hi Hi Temperature	Critical Hot Temperature (All operations Stop) [℃/10	INTEGER 16	RO	950
	3	Hi Temperature	Warning for Too Hot Temperature [℃/10]	INTEGER 16	RO	900
	4	Low Temperature	Critical Low Temperature (All operations Stop) [℃/10]	INTEGER 16	RO	-250
0x2051	0	CPU Command	Command to execute Supported commands are: 0x5C0n Force preset for counter mask nn 0x5D0n Force reset for counter mask nn 0x5E0n Force overflow for counter mask nn	UNSIGNED 16	RW	0
0x2052	0	Aux Command	Reserved	UNSIGNED 16	RW	0
0x2520	0	Output Status	Max Subindex Number	UNSIGNED 8	RO	3
	1	Output [1..8] Status	1 = Output status ERROR 0 = Output status OK	UNSIGNED 8	RW	0
	2	Output [9..16] Status	1 = Output status ERROR 0 = Output status OK	UNSIGNED 8	RW	0
	3	Output [17..24] Status	1 = Output status ERROR 0 = Output status OK	UNSIGNED 8	RW	0
0x2521	0	Output Fail type	Max Subindex Number	UNSIGNED 8	RO	3
	1	Fail type Output [1..8]	Reserved	UNSIGNED 32	RW	0
	2	Fail type Output [9..16]	Reserved	UNSIGNED 32	RW	0
	3	Fail type Output [17..24]	Reserved	UNSIGNED 32	RW	0

INDEX	SUB INDEX	NAME	DESCRIPTION	TYPE	ACCESS	DEFAULT
0x6200	0	8 bit Output	Max Subindex Number	UNSIGNED 8	RO	1
	1	Output 1.8 Value	Output 1..8 values	UNSIGNED 32	RW	0
	2	Output 9..16 Value	Output 9..16 values	UNSIGNED 32	RW	0
	3	Output 17..24 Value	Output 17..24 values	UNSIGNED 32	RW	0
0x6206	0	Error Mode Output	Max Subindex Number	UNSIGNED 8	RO	1
	1	Output [1..8] Error Mode	“1” = Load 0x6207 value “0” = Keep last	UNSIGNED 32	RW	0xFF
	2	Output [9..16] Error Mode	“1” = Load 0x6207 value “0” = Keep last	UNSIGNED 32	RW	0xFF
	3	Output [17..24] Error Mode	“1” = Load 0x6207 value “0” = Keep last	UNSIGNED 32	RW	0xFF
0x6207	0	Error Value Output	Max Subindex Number	UNSIGNED 8	RO	1
	1	Output [1..8] Error Value	Value to load in fail case	UNSIGNED 32	RW	0x00
	2	Output [9..16] Error Value	Value to load in fail case	UNSIGNED 32	RW	0x00
	3	Output [17..24] Error Value	Value to load in fail case	UNSIGNED 32	RW	0x00
0x6220	0	Single bit Output	Max Subindex Number	UNSIGNED 8	RO	8
	1	Output 1 value	Output value	BOOLEAN	RW	0
	2	Output 2 value	Output value	BOOLEAN	RW	0
	3	Output 3 value	Output value	BOOLEAN	RW	0
	4	Output 4 value	Output value	BOOLEAN	RO	0
	5	Output 5 value	Output value	BOOLEAN	RW	0
	6	Output 6 value	Output value	BOOLEAN	RW	0
	7	Output 7 value	Output value	BOOLEAN	RW	0
	8	Output 8 value	Output value	BOOLEAN	RO	0
	9	Output 9 value	Output value	BOOLEAN	RW	0
	10	Output 10 value	Output value	BOOLEAN	RW	0
	11	Output 11 value	Output value	BOOLEAN	RW	0
	12	Output 12 value	Output value	BOOLEAN	RO	0
	13	Output 13 value	Output value	BOOLEAN	RW	0
	14	Output 14 value	Output value	BOOLEAN	RW	0
	15	Output 15 value	Output value	BOOLEAN	RW	0
	16	Output 16 value	Output value	BOOLEAN	RO	0
	17	Output 17 value	Output value	BOOLEAN	RW	0
	18	Output 18 value	Output value	BOOLEAN	RW	0
	19	Output 19 value	Output value	BOOLEAN	RW	0
	20	Output 20 value	Output value	BOOLEAN	RO	0
	21	Output 21 value	Output value	BOOLEAN	RW	0

INDEX	SUB INDEX	NAME	DESCRIPTION	TYPE	ACCESS	DEFAULT
0x6220	22	Output 22 value	Output value	BOOLEAN	RO	0
	23	Output 23 value	Output value	BOOLEAN	RO	0
	24	Output 24 value	Output value	BOOLEAN	RO	0

MODBUS FEATURES

TECHNICAL DATA	
BAUD RATE	2.4, 4.8, 9.6,19.2, 38.57.6, 115.2 Kbits/s

DIP-SWITCH CONFIGURATION

BAUD RATE (kbps)		ADDRESS	
1 2 3 SOFTWARE PROGRAMMED		4 5 6 7 8 9 10	SOFTWARE PROGRAMMED
CANopen	ModBus		
20	2.4	0000000	
50	4.8	0000001	ADD. 001
125	9.6	0000010	ADD. 002
250	19.2	0000011	ADD. 003
500	38.4	0000100	ADD. 004
800	57.6	0000101	ADD. 005
1000	115.2	.....	.....
		1111111	ADD. 127

Type of communication		
Protocol	SW2	SW4
ModBus		
CANopen		

ModBus TERMINATOR	
SW3	State
	ENABLE
	DISABLE

MODBUS LED DESCRIPTION

SERVICE LED DESCRIPTION		
LED	STATE	DESCRIPTION
RUN/TX	ON	Data Transmission
ERR/RX	ON	Data Receiving
FAIL	ON BLINKING	Data receiving from RS232
POWER	ON	Power Supply

OUTPUT LED DESCRIPTION		
LED	STATE	DESCRIPTION
1…8	ON	Output [1..8] is high
	OFF	Output [1..8] is low
9…16	ON	Output [9..16] is high
	OFF	Output [9..16] is low
17…24	ON	Output [17..24] is high
	OFF	Output [17..24] is low

MODBUS REGISTERS

Holding Registers

ADDRESS	REGISTER	DESCRIPTION	TYPE	ACCESS	DEFAULT
40001	MACH-ID/EXT_FW_REV	machine id = 0x20 ext revision 1	FLASH	R	0x2001
40002	FW_CODE	Seneca FW Code	FLASH	R	1182
40003	OUTPUT 1..8	Output 1…8	RAM	R	0
40004	OUTPUT 9..16	Output 9…16	RAM	R	0
40005	OUTPUT 17..24	Output 17…24	RAM	R	0
40006	OUTPUT 1..8 STATUS	Status	RAM	R/W	0
40007	OUTPUT 9..16 STATUS	Status	RAM	R/W	0
40008	OUTPUT 17..24 STATUS	Status	RAM	R/W	0
40009	ERROR MODE 1..8	Output 1..8 Error Mode	FLASH	R/W	0xFF
40010	ERROR MODE 9..16	Output 9..16 Error Mode	FLASH	R/W	0xFF
40011	ERROR MODE 17..24	Output 17..24 Error Mode	FLASH	R/W	0xFF
40012	ERROR VALUE 1..8	Output 1..8 Error Values	FLASH	R/W	0
40013	ERROR VALUE 9..16	Output 9..16 Error Values	FLASH	R/W	0
40014	ERROR VALUE 17..24	Output 17..24 Error Values	FLASH	R/W	0
40015	ADDR CAN	CANOpen Address 127	FLASH	R/W	127
40016	BAUD CAN	CANOpen Baudrate 20 kbps	FLASH	R/W	1
40018	ADDR/PARITY MODBUS	Modbus Address 1, no parity	FLASH	R/W	0x0100
40019	BAUD/DELAY MODBUS	Modbus Baudrate 38400, no delay	FLASH	R/W	0x0500
40020	MODBUS FAIL COMM MODE	Modbus communication monitoring result	FLASH	R/W	0
40021	MODBUS FAIL TIMEOUT	Timeout for Modbus communication monitoring [1/10 s]	FLASH	R/W	100
40201	COMMAND	Enter register for COMMAND	RAM	R/W	0
40202	COMMAND_AUX	Service register for COMMAND	RAM	R	0
40301	OUTPUTS [1..16]		RAM	R	0
40302	OUTPUTS- [17..24]		RAM	R	0

Modbus FAIL Communication

During Modbus Communication, a traffic monitoring is improved; so, if for a fixed time (MODBUS FAIL TIMEOUT) there is no data transmission/reception and MODBUS FAIL COMM MODE = 1, the device is in FAIL condition and Error values are loaded.

Command Modbus

COMMAND	
COD	DESCRIPTION
0xBAB0	Save in FLASH
0xBCD0	Load default
0x6BAC	DIP-SW Read
0xC1A0	Reset Module

Coil Registers

ADDRESS	REGISTER	DESCRIPTION	TYPE	ACCESS	DEFAULT
10001	OUTPUT1	Output1	RAM	R/W	0
10002	OUTPUT2	Output2	RAM	R/W	0
10003	OUTPUT3	Output3	RAM	R/W	0
10004	OUTPUT4	Output4	RAM	R/W	0
10005	OUTPUT5	Output5	RAM	R/W	0
10006	OUTPUT6	Output6	RAM	R/W	0
10007	OUTPUT7	Output7	RAM	R/W	0
10008	OUTPUT8	Output8	RAM	R/W	0
10009	OUTPUT9	Output9	RAM	R/W	0
10010	OUTPUT10	Output10	RAM	R/W	0
10011	OUTPUT11	Output11	RAM	R/W	0
10012	OUTPUT12	Output12	RAM	R/W	0
10013	OUTPUT13	Output13	RAM	R/W	0
10014	OUTPUT14	Output14	RAM	R/W	0
10015	OUTPUT15	Output15	RAM	R/W	0
10016	OUTPUT16	Output16	RAM	R/W	0
10017	OUTPUT17	Output17	RAM	R/W	0
10018	OUTPUT18	Output18	RAM	R/W	0
10019	OUTPUT19	Output19	RAM	R/W	0
10020	OUTPUT20	Output20	RAM	R/W	0
10021	OUTPUT21	Output21	RAM	R/W	0
10022	OUTPUT22	Output22	RAM	R/W	0
10023	OUTPUT23	Output23	RAM	R/W	0
10024	OUTPUT24	Output24	RAM	R/W	0

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